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COAL BEDS IN CLARION COUNTY, PENNSYLVANIA

By

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Introduction

Clarion County has twelve coal beds, four of which are now being worked for shipping coal; five others are mined for local fuel, and the remainder are of no commercial importance at present.

In 1918 Clarion County ranked twelfth in Pennsylvania as a bituminous coal producing county. In that year 1,607,641 tons were produced, valued at \$4,598,365; of the total amount, 1,502,101 tons valued at \$4,300,465 were loaded at the mines for shipment; 80,314 tons, valued at \$180,867, were sold to local trade and used by employees; 25,226 tons, valued at \$117,033, were used at the mines for steam and heat. None of the coal was made into coke at the mines.

Clarion County is bounded on the north and northeast by Forest County, on the east by Jefferson County, on the south and southwest by Armstrong County, and on the northwest by Venango County. Its area is 601 square miles; its greatest width is 26 miles, and its greatest length 32.5 miles. Its population in 1920 was 36,170.

The Pennsylvania Railroad follows Redbank Creek from the eastern county line to its mouth, and the east bank of Allegheny River from Red Bank to Enlenton. A branch line runs between Lawsonham, Rinerburg and Sligo. The Baltimore and Ohio Railroad runs northeast from St. Petersburg to Shippensburg, and thence to the northeast corner of the county. The New York Central Railroad crosses the county in a general northwest direction from Sutton and enters Venango County just east of Van. The Lake Erie, Franklin & Hamilton Railroad serves the section east of the county seat.

Practically all the highways are dirt, and the main traveled ones are kept in good condition. Coal for local use is transported over the highways.

The surface of Clarion County is very hilly and much dissected by streams. The larger streams flow in canyon-like gorges, with narrow flood plains and precipitous slopes. The valleys of the smaller streams are disproportionately wider, and have a very small gradient near their headwaters. The more or less uniform level of the higher hilltops represent the remnants of an old peneplain.

On the lower part of Clarion River and on Allegheny River the slopes are broken by terraces, most of which are between 200 and 210 feet above the present stream levels. These terraces cut in sandstone, and are covered with a layer of glacial gravel, in places over 100 feet thick.

STRUCTURE.

All the structural features of Clarion County, with the exception of the Fairmount syncline, are not well defined, and form a part of an irregular monocline, rising gently northwest.

Fairmount syncline lies in the southeast corner of the county, just west of Hawthorne and Shannondale. The greatest dips in the county are on the flanks of this basin, the rocks on the southeastern flank dipping from 100 to 150 feet per mile, and on the northwestern flank from 100 to 175 feet per mile. The axis rises gradually northeast.

Kellersburg anticline, lying northwest of Fairmount syncline, crosses Redbank Creek one mile west of Climax, extends northeast near Frogtown and leaves the county a few miles north of Corsica. The southeastern flank of the anticline dips 75 to 175 feet per mile; the northwest flank dips 50 to 125 feet per mile. The axis is well defined, and rises regularly northeast.

Brady's Bend syncline crosses Redbank Creek about two miles east of Lawsonham, follows a direct northeast course to Rockville, turns sharply to a direction a little east of north, and disappears near Brinkerton. The dips on the flank of this syncline are 25 to 75 feet per mile; the axis gradually rises northeast.

Rimersburg anticline is a low fold extending from Rimersburg to Sharpsburg Church. It seems to be a limb of Kellersburg anticline that is nearly cut off by Brady's Bend syncline. The fold is best developed near Rimersburg, but dies out a short distance west of that place.

Northwest of Kellersburg anticline in the northern part of the county is a broad shallow basin, with the rocks rising gradually northwest to the axis of a minor anticlinal fold.

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The rocks in the western part of the county rise gradually northwest in an anticlinal fold, with irregular dips where local minor structures disturb it.

STRATIGRAPHY.

The consolidated rocks exposed in Clarion County belong to the Mississippian and Pennsylvanian series of the Carboniferous system. The unconsolidated stream gravels along stream valley are of Quaternary age.

The Conemaugh formation has been almost entirely eroded in Clarion County, only a maximum thickness of 230 feet remaining in the hills in the southern part. It is composed of massive sandstone, shales, limestones, and thin coal beds.

The upper part of the Allegheny formation has been much eroded in Clarion County, remaining intact only in a few hills in the southern part of the county. The lower part is widespread in all but Farmington township. The formation is composed of massive sandstone, shale, clay beds, limestone, and several important coal beds.

The Pottsville formation is composed of two massive sandstones, with a shale, clay, and coal interval between them. It is exposed in the northern part of the county, and along Clarion River and Piney Creek. As the Mauch Chunk formation is lacking, the Pottsville formation lies unconformably on the Burgoon sandstone.

The Pocono formation is the lowest that outcrops in Clarion County. Its principal exposure is on Clarion River above Clarion. It is composed of shales and sandstone, and is not coal bearing.

COAL BEDS.

The following table shows the stratigraphic relation and the range in thickness of the coal beds.

Coal beds in Clarion County.

Name of coal bed	Average interval	Range in thickness of coal beds.
Brush Creek		0' - 1' 0"
Mahoning		0' - 1' 6"
	interval 70'	
(Upper Freeport ("E")		0' - 6' 3"
(interval	40'	
(Lower Freeport ("D")		0' - 7' 0"
(interval	55'	
(Upper Kittanning ("C'")		0' - 4' 0"
(interval	60'	
(Middle Kittanning ("C")		0' - 2' 6"
(interval	55'	
Allegheny 310'	(Lower Kittanning ("B")	1' - 4' 6"
	(interval	60'
	(Clarion, upper	0' - 4' 8"
	(interval	15'
	(Clarion, lower	2' - 7' 0"
	(interval	25'
	(Brookville ("A") or "Craigsville"	0' - 4' 6"
	(interval	40'
Mercer		0' - 2' 0"

Mercer Coal or Coals. The shales lying between the Homewood and Connoquenessing sandstones of the Pottsville formation contain one or more coal beds that are impure and never are more than a few inches thick. Drillers often report black shale at this horizon.

Brookville ("A") Coal. This coal, lying a few feet above the Homewood sandstone, is a very irregular but persistent bed in Clarion County. It is locally 4 feet 6 inches thick along Clarion River in the eastern part of the county, but is rather dirty and high in sulphur. Two miles southeast of Madison schoolhouse it is 2 feet 9 inches thick, including a 7-inch parting of shale and pyrite in the middle. It is mined east of Kingsville and west of Sutton and it is opened two miles west of Williamsburg, where it is 2 feet 4 inches thick. At Sligo and northeast of New Bethlehem it is locally 3 feet thick, but impure, and high in sulphur.

In the vicinity of Knox the Brookville bed is divided into several benches by thick shale partings, the distance from the top of the highest bench to the bottom of the lowest being 15 feet. The bed is similarly parted at Shippensburg, but toward the south the partings become thinner and disappear.

Work during 1921 demonstrated what has long been suspected that the "Craigsburg" coal of the Foxburg-Clarion facies is the equivalent of the Brookville coal at Brookville, and that coals locally mapped as Brookville are at the Mercer horizon. Due to this error confusion will exist in this area until the survey of the county is revised. The intervals given in the columnar sections have been revised.

Clarion Lower Coal. This bed, lying about 40 feet above the Brookville, is the second most important bed in Clarion County. It is the most important coal in the southwest part of the county where it is persistent, and from 2 to 7 feet thick. It contains a large quantity of iron pyrite and is called the "sulphur vein." It averages 4 feet thick on Allegheny River in Richland township, and is mined for shipping coal. It is parted 10 inches from the bottom by 16 inches of bony coal. The Clarion Lower coal is mined near West Monterey, averages 3 feet thick, and has a persistent 1-inch band of pyrite 9 inches from the bottom. It is mined near Clarion and has a maximum thickness of 6 feet, averaging 5 feet. It carries a 2-inch pyrite band 2 feet 5 inches from the top, 7 inches of bony coal, 17 inches from the bottom, and is locally bony at the top.

The Lower Clarion coal is of little value in the southeastern part of the county, where it averages a little over 2 feet thick.

The Lower Clarion coal ranges from 37 to 39 per cent volatile matter, averaging 38 per cent; 46 to 52 per cent fixed carbon, averaging 48 per cent; 6 to 11 per cent ash, averaging 9 per cent; 3 to 6 per cent sulphur, averaging 4.5 per cent. The coal is generally hard and blocky, although locally it is soft and friable, and slacks when mined.

Clarion Upper Coal. This bed, lying from 10 to 20 feet above the Clarion Lower coal, seems to be split from that bed. It is extremely irregular, varying within a few feet from a few inches to 4 feet thick. Between Parkers Landing and St. Petersburg the coal is nearly 5 feet thick in places, and has been mined for shipment.

Lower Kittanning ("B") Coal. This bed, lying about 100 feet above the Brookville, is the most persistent and important producing bed in Clarion County. The Lower Kittanning is persistent and uniform in thickness, averaging about 3 feet thick. No regular partings occur in the coal, and local partings are thin, few of them over $\frac{1}{2}$ inch thick.

The Lower Kittanning is 4 feet 6 inches thick at St. Petersburg, and carries a 2-inch bone parting, twelve inches from the bottom. The lower bench is dirty. It is 3 feet 9 inches thick at Parker, and carries two 1-inch sulphur and bone-coal partings, one 7 inches above

the bottom, and the other 12 inches below the top. The bed is 3 feet thick at Upper Hillville, and carries no partings, but numerous lenses of pyrite. At Catfish it is 4 feet thick, including 6 inches of bony coal at the top; at Philipstown 3 feet 10 inches thick, including a $\frac{1}{2}$ -inch pyrite band two feet above the bottom, and 3 inches of bony coal at the top. It is 4 feet 4 inches thick at Red Bank, including 6 inches of bony coal at the top.

The Lower Kittanning is mined extensively on the Sligo branch of the Pennsylvania Railroad, and averages 3 feet 6 inches thick at Lawsonham, Ringersburg and Sligo. It invariably carries about 4 inches of bony top coal. The bed thins to an average of 2 feet 8 inches in the southeastern part of the county.

The Lower Kittanning averages 2 feet 10 inches thick in the vicinity of Clarion, including 3 inches of bone coal at the top, and a bone binder 5 inches below the bony coal. It seems to thin north and west.

In the vicinity of Wentlings Corners the bed is 3 feet 2 inches thick, is unusually free from sulphur, and has been used as a black-smithing coal. The bed thins westward.

One mile southwest of Zion Hill the Lower Kittanning is separated into two benches by a shale parting 13 feet thick. The upper bench is 3 feet 3 inches thick, and the lower one 15 inches thick. Both benches are good clean coal.

The Lower Kittanning coal varies from 35 to 40 per cent volatile matter, 49 to 53 per cent fixed carbon, 5 to 10 per cent ash, and from 0.8 to 4 per cent sulphur. It is a stick and block coal, brilliant in lustre, and mines out in fair sized lumps.

Middle Kittanning ("C") Coals. These two coals, which lie about 60 and 75 feet above the Lower Kittanning, are very irregular, but locally reach a maximum thickness of 2 feet 6 inches. North of Clarion River the Middle Kittanning is very thin, and entirely lacking in large areas. South of Clarion River the bed averages 16 inches thick, but is not persistent. At Mount Airy the bed is separated into two benches by 18 inches of shale; the lower bench is $4\frac{1}{2}$ inches thick, and the upper one 21 inches thick. On Redbank Creek it is locally 2 feet 6 inches thick, and is mined by farmers.

Upper Kittanning ("C") Coal. The Upper Kittanning coal, lying about 110 feet above the Lower Kittanning, is so variable in thickness that it is called the "Pot vein." North of Clarion River it is thin, locally reaching mineable thickness two miles north of St. Petersburg.

South of Clarion River the Upper Kittanning varies from a few inches to 4 feet in thickness within a few yards. It may be mineable one mile east of West Freedom, where it is 21 inches thick, including a 2-inch shale parting near the middle of the bed. It reaches a local maximum thickness of 3 feet 5 inches one mile northeast of New Athens, and is good clean coal. Near New Bethlehem the Upper Kittanning is

from 3 to 4 feet thick in a considerable area.

Lower Freeport ("D") Coal. This bed lies about 165 feet above the Lower Kittanning. It is probably entirely eroded north of Clarion River and is contained only in the highlands south of that river. Its area is greater, and its thickness more regular than the Upper Freeport, but it is thin and carries numerous partings.

Between Parkers Landing and Ringersburg the Lower Freeport is separated by a shale parting 1 to 2 feet thick, into two benches, each ranging from 1 to 3 feet thick. The bed is from 3 feet 6 inches to 7 feet thick in the vicinity of New Bethlehem, but is nearly worked out.

Upper Freeport ("E") Coal. The Upper Freeport coal lies about 200 feet above the Lower Kittanning and 40 feet above the Lower Freeport. Its area is confined to some 50 hilltops along the southern border of the county. It ranges from 18 inches to 6 feet 3 inches thick, not including persistent bony benches above and below the good coal. Next to the Lower Kittanning and Clarion coal, it ranks third in importance in the county, and is persistent and mineable in practically its entire area.

One mile northeast of Dutch Hill the Upper Freeport is 2 feet 10 inches thick, including two thin shale partings; $2\frac{1}{2}$ miles northeast of Eagle Mine it is 2 feet 7 inches thick, and has no distinct impurities. One mile northwest of Kissingers Mill it varies from 14 inches to 3 feet 4 inches thick, and is clean coal; $1\frac{1}{2}$ miles northwest of Ringersburg it is 5 feet thick, including small bony benches at the top and bottom of the bed. Probably the greatest thickness of the bed is 1 mile southwest of Maple Grove where it is 6 feet 3 inches thick, including thick benches of bony coal at the top and bottom. One-half mile northeast of New Athens the bed is 4 feet 6 inches thick, but very bony. At Sandy Hollow the bed is 3 feet 1 inch thick, and the coal is clean.

Conemaugh Coals. The Mahoning, Brush Creek, and Bakerstown coals average about 6 inches thick, and are not mineable.

